WHAT IS CLAIMED IS:

1. An electron beam apparatus characterized by comprising:

a first substrate that is provided in a vacuum container and that includes a plurality of electron-emitting devices;

a second substrate that in said vacuum container is located opposite said first substrate and that is irradiated by electrons emitted by said electron-emitting devices;

one spacer, at least, that is mounted as an atmospheric-pressure resistant structure on one of said first and said second substrates, that is sandwiched directly between said first and said second substrates, or indirectly via an intermediate member between said first and said second substrates, and that is extended longitudinally in a direction perpendicular to the direction in which said first and said second substrates are positioned opposite each other; and

a support member, for supporting said spacer outside an electron-emitting region that is defined between a region of said first substrate wherein said electron-emitting devices are located, and a region of said second substrate that is irradiated by said electrons,

wherein at least said spacer or said support member has a structure that relieves the stress that is

generated when said spacer is sandwiched between said first and said second substrates.

2. An electron beam apparatus according to claim 1, wherein said spacer is fixed to said support member; and wherein a structure for reducing said stress is provided, so that at a boundary between said portion fixed to said support member and said electron-emitting region, said spacer has an easily bent portion that bends more easily than the other portions in the direction in which said first substrate faces said second substrate.

3. An electron beam apparatus according to claim 2, wherein said easily bent portion is a portion that, at the least, does not contact either said first or said second substrate, when said spacer is sandwiched between said first and said second substrates.

4. An electron beam apparatus according to claim 1, wherein said support member is fixed to said first or said second substrate, and wherein said structure for reducing said stress is a structure wherein the ends of said spacer are inserted into grooves formed in said support member.

5. An electron beam apparatus according to claim

1, wherein said structure for reducing said stress is so designed that said support member is formed of a material that is softer than said spacer.

6. An electron beam apparatus according to claim 1, wherein said structure for reducing said stress is so designed that said support member is shorter than said spacer in the direction in which said first substrate faces said second substrate.

7. An electron beam apparatus characterized by comprising:

a first substrate that is provided in a vacuum container and that includes a plurality of electron-emitting devices;

a second substrate that in said vacuum container is located opposite said first substrate and that is irradiated by electrons emitted by said electron-emitting devices;

one spacer, at least, that is mounted as an atmospheric-pressure resistant structure on one of said first and said second substrates, that is sandwiched directly between said first and said second substrates, or indirectly via an intermediate member between said first and said second substrates, and that is extended longitudinally in a direction perpendicular to the direction in which said first and said second

substrates are positioned opposite each other; and

a support member that, outside an electron-emitting region that is defined between a region of said first substrate wherein said electron-emitting devices are located and a region on said second substrate that is irradiated by said electrons, is mounted on said substrate whereon said spacer is provided so that said support member supports said spacer,

wherein said support member and said spacer are secured to each other, so that a first axis of said support member, which is positioned parallel to the face of said support member that is mounted on said substrate, is substantially parallel to a second axis of said spacer that is extended in said longitudinal direction.

8. An electron beam apparatus according to claim 7, wherein said support member is shorter than said spacer in the direction in which said first substrate faces said second substrate.

9. An electron beam apparatus characterized by comprising:

a first substrate that is provided in a vacuum container and that includes a plurality of electron-emitting devices;

a second substrate that in said vacuum container is located opposite said first substrate and that is irradiated by electrons emitted by said electron-emitting devices;

one spacer, at least, that is mounted as an atmospheric-pressure resistant structure on one of said first and said second substrates, that is sandwiched directly between said first and said second substrates, or indirectly via an intermediate member between said first and said second substrates, and that is extended longitudinally in a direction perpendicular to the direction in which said first and said second substrates are positioned opposite each other; and

a support member, for supporting said spacer outside an electron-emitting region that is defined between a region of said first substrate wherein said electron-emitting devices are located, and a region of said second substrate that is irradiated by said electrons,

wherein said spacer has a thermal expansion rate that is smaller than said substrate on which said spacer is mounted.

10. An electron beam apparatus according to claim 9, wherein a difference between the thermal expansion ratio of said substrate on which said spacer is mounted and the thermal expansion ratio of said spacer does not

exceed 5%.

11. An electron beam apparatus according to claim 9, wherein said support member supports a plurality of said spacers.

12. An electron beam apparatus according to claim 11, wherein, while said support member is fixed to said spacer, said support member is fixed, together with said spacer, to said substrate on which said spacer is to be mounted.

13. An electron beam apparatus according to claim 1, wherein said support members support one or both longitudinal ends of said spacer.

14. An electron beam apparatus according to claim 7, wherein said support members support one or both longitudinal ends of said spacer.

15. An electron beam apparatus according to claim 9, wherein said support members support one or both longitudinal ends of said spacer.

16. An electron beam apparatus according to claim 1, wherein, in said electron-emitting region, a film that is charged less easily than the surface of a base

member that serves as said spacer is deposited on the surface of said spacer that is exposed in said vacuum container.

17. An electron beam apparatus according to claim 7, wherein, in said electron-emitting region, a film that is charged less easily than the surface of a base member that serves as said spacer is deposited on the surface of said spacer that is exposed in said vacuum container.

18. An electron beam apparatus according to claim 9, wherein, in said electron-emitting region, a film that is charged less easily than the surface of a base member that serves as said spacer is deposited on the surface of said spacer that is exposed in said vacuum container.

19. An electron beam apparatus according to claim 16, 17 or 18, wherein said second substrate includes an electrode for controlling electrons that are emitted by said electron-emitting devices, and wherein said film is, at the least, electrically connected to either said first substrate or said electrode.

20. An electron beam apparatus according to claim 19, wherein said film includes a high resistance film

having a sheet resistance of 10^7 Ω/□ to 10^{14} Ω/□.

21. An electron beam apparatus according to claim 20, wherein, at least in a region in which said film is electrically connected, said film includes a low resistance film having a sheet resistance equal to or smaller than 1/10 of said high resistance film, and equal to or higher than 10^7 Ω/□.

22. An electron beam apparatus according to claim 16, 17 or 18, wherein at least one part of said film has a secondary electron emission coefficient of two or smaller.

23. An electron beam apparatus characterized by comprising:

a first substrate that is provided in a vacuum container and that includes a plurality of electron-emitting devices;

a second substrate that in said vacuum container is located opposite said first substrate and that is irradiated by electrons emitted by said electron-emitting devices; and

one spacer, at least, that is mounted as an atmospheric-pressure resistant structure on one of said first and said second substrates, that is sandwiched directly between said first and said second substrates,

or indirectly via an intermediate member between said first and said second substrates, and that is extended longitudinally in a direction perpendicular to the direction in which said first and said second substrates are positioned opposite each other,

wherein a film, which is to be electrically connected to either said first substrate or said electrode and is not to be charged as easily as said surface of said spacer, is formed on the surface of said spacer at a plurality of portions in said longitudinal direction of said spacer.

24. An electron beam apparatus according to claim 23, wherein said film is deposited on a surface of said spacer that is exposed into said vacuum container.

25. An electron beam apparatus according to claim 23 or 24, wherein said film includes a high resistance film having a sheet resistance of 10^7 Ω/□ to 10^{14} Ω/□.

26. An electron beam apparatus according to claim 25, wherein, at least in a region in which said film is electrically connected, said film includes a low resistance film having a sheet resistance equal to or smaller than 1/10 of said high resistance film, and equal to or higher than 10^7 Ω/□.

27. An electron beam apparatus according to claim 23, wherein at least one part of said film has a secondary electron emission coefficient of two or smaller.

28. An electron beam apparatus characterized by comprising:

a first substrate that is provided in a vacuum container and that includes a plurality of electron-emitting devices;

a second substrate that in said vacuum container is located opposite said first substrate and that is irradiated by electrons emitted by said electron-emitting devices; and

one spacer, at least, that is mounted as an atmospheric-pressure resistant structure on one of said first and said second substrates, that is sandwiched directly between said first and said second substrates, or indirectly via an intermediate member between said first and said second substrates, and that is extended longitudinally in a direction perpendicular to the direction in which said first and said second substrates are positioned opposite each other,

wherein on the surface of said spacer are formed a highly resistant film, which is electrically connected either to said first substrate or to said electrode and which is not charged as easily as said surface of said

spacer, and a low resistant film, which is laminated over said highly resistant film in said electrically connected region and which has a sheet resistance smaller than said highly resistant film, and

wherein said highly resistant film and said low resistant film contain the same metal elements but have different compositions.

29. An electron beam apparatus according to claim 28, wherein said high resistance film and said low resistance film are sequentially formed in said same chamber by a vapor deposition method, without destroying the vacuum in said chamber.

30. An electron beam apparatus according to claim 28 or 29, wherein said low resistance film has a sheet resistance equal to or smaller than 1/10 of said high resistance film, and equal to or higher than 10^7 Ω/□.

31. An electron beam apparatus according to claim 1, wherein said electron-emitting devices are connected by wiring laid on said first substrate, and said film is electrically connected to said first substrate by said wiring.

32. An electron beam apparatus according to claim 7, wherein said electron-emitting devices are connected

by wiring laid on said first substrate, and said film is electrically connected to said first substrate by said wiring.

33. An electron beam apparatus according to claim 9, wherein said electron-emitting devices are connected by wiring laid on said first substrate, and said film is electrically connected to said first substrate by said wiring.

34. An electron beam apparatus according to claim 23, wherein said electron-emitting devices are connected by wiring laid on said first substrate, and said film is electrically connected to said first substrate by said wiring.

35. An electron beam apparatus according to claim 28, wherein said electron-emitting devices are connected by wiring laid on said first substrate, and said film is electrically connected to said first substrate by said wiring.

36. An electron beam apparatus according to claim 31, 32, 33, 34 or 35, wherein said electron-emitting devices are arranged in a matrix shape, and wherein said wiring is matrix wiring that is formed of a plurality of row-directional wiring lines and a

plurality of column-directional wiring lines.

37. An electron beam apparatus according to claim 31, 32, 33, 34 or 35, wherein said wiring includes a plurality of row-directional wiring lines, and said electron-emitting devices are connected to adjacent row-directional wiring lines among said row-directional wiring lines.

38. An electron beam apparatus according to claim 1, wherein said electron-emitting devices are cold cathode devices.

39. An electron beam apparatus according to claim 7, wherein said electron-emitting devices are cold cathode devices.

40. An electron beam apparatus according to claim 9, wherein said electron-emitting devices are cold cathode devices.

41. An electron beam apparatus according to claim 23, wherein said electron-emitting devices are cold cathode devices.

42. An electron beam apparatus according to claim 28, wherein said electron-emitting devices are cold

cathode devices.

43. An electron beam apparatus according to claim 38, 39, 40, 41 or 42, wherein said electron-emitting devices are cold cathode devices.

44. An electron beam apparatus according to claim 43, wherein said electron-emitting devices are cold cathode devices.

45. An electron beam apparatus according to claim 1, wherein an image-forming member, for forming an image by the irradiation of electrons that are emitted by said electron-emitting devices, is provided for said second substrate.

46. An electron beam apparatus according to claim 7, wherein an image-forming member, for forming an image by the irradiation of electrons that are emitted by said electron-emitting devices, is provided for said second substrate.

47. An electron beam apparatus according to claim 9, wherein an image-forming member, for forming an image by the irradiation of electrons that are emitted by said electron-emitting devices, is provided for said second substrate.

48. An electron beam apparatus according to claim 23, wherein an image-forming member, for forming an image by the irradiation of electrons that are emitted by said electron-emitting devices, is provided for said second substrate.

49. An electron beam apparatus according to claim 28, wherein an image-forming member, for forming an image by the irradiation of electrons that are emitted by said electron-emitting devices, is provided for said second substrate.

50. An electron beam apparatus according to claim 45, 46, 47, 48 or 49, wherein said image-forming member is a phosphor film including phosphors that emit light when struck by electrons that are emitted by said electron-emitting devices.